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ABSTRACT

This article describes a preservice teacher-training curriculum in computer technology, "OPEN," currently being implemented at the University of Akron, and the program's successful results. A survey, preservice teacher course evaluations, and curriculum research contributed to the development and implementation of the OPEN computer program for preservice teachers. A description is given of the four stages of the OPEN model: (1) overcome anxiety, (2) practice until mastery, (3) educate beyond, and (4) network for survival. The instructional model strives to promote the development of computer competencies through a cyclical training process. (JD)

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A Computer Literacy Curriculum
for
Pre-Service Teachers

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A Computer Literacy Curriculum for Pre-Service Teachers

A pre-service teacher at The University of Akron recently remarked, "I am totally computer illiterate and nothing is going to change the situation." A peer reacted to the comment saying, "So am I, but I know that I need to do something about it. The students at the school where I will be student teaching next semester are really into computers, and I can barely remember how to turn the machine on.!" The attitudes and concerns of these pre-service teachers reflect an awareness that computers have infiltrated the schools at an alarming pace. Twenty-five years ago, public schools were only able to gain access to mainframe computers located at larger institutions for administrative uses, such as, student schedules, report cards, attendance records and counseling statistics (Teague & Rogers, 1983). But as the cost of microcomputers decreased and the capabilities of the machine increased, educators began to purchase personal computers and encourage the development of computer literacy courses at the collegiate, secondary, and elementary levels (Poirot, 1980).

The purchase of microcomputers by educators was motivated by price as well as the belief that this new teaching tool would be able to present information, record responses, evaluate selections, reward effort, and remediate users (Teague & Rogers, 1983). Educators realized that the computer could be integrated into many areas of the school curriculum, so computer literacy courses were written to accomplish these goals (Joiner, Miller, & Silverstein, 1980). The word processor could be used in English, automated accounting in business education, experimental simulation in science, the spreadsheet in mathematics, and the data base in social studies. The computer industry responded to these educational realizations by saturating the market with software packages, computer catalogs, and educational hardware.

In addition, school administrators felt pressured to purchase computers in an effort to respond to the computer recommendations promoted in the national report A Nation at Risk (Black & Decker, 1986). Moreover, public opinion calling for the implementation of technological equipment forced other school districts to buy computers (Black & Decker, 1986). Finally, twenty states sought to impress upon educators the importance of "computer literacy" - a phrase born in the 1980s with no universally accepted definition - by mandating the course as a requirement for graduation (Crawford, 1984).

Political pressure, public opinion, Madison Avenue marketing strategies, and A Nation at Risk combined to exert pressure on educators to plan, purchase, and promote computer technology throughout the school curriculum. However, relatively little attention was given to the development and training of teachers - those primarily responsible for implementing the technology.

The purpose of this article is to describe a pre-service training curriculum in computer technology. Specifically, the article will examine the teacher education program titled, "OPEN" that is currently being implemented at The University of Akron and the program's successful results.

Rationale for Change

The Department of Secondary Education in the College of Education at The University of Akron instituted a semester course in 1984 called, "Microcomputer Applications for Secondary Teachers." This two credit hour course, which was and is required for all students seeking a secondary certification, focused on programming in BASIC using the Apple IIe system.

During the semester, a student was exposed to various programming techniques through lecture and laboratory activities. Homework assignments from the course textbook Programming for Microcomputers: Apple II BASIC by June Shane, three objective tests, and a programming project were used to evaluate student performances. The programming project was a subject-specific quiz written in BASIC with positive reinforcements for the user. Student comments at the end of the semester seemed to reflect the following sentiments: (a) an overemphasis on programming techniques, (b) lack of practical teaching applications, and (c) a desire to become familiar with computer systems in addition to the Apple IIe.

The Department of Secondary Education recognized these student concerns as expressed in class evaluations and proceeded to conduct a survey to determine what computer competencies the next generation of pre-service teachers should possess. Six randomly selected school districts within a fifteen mile radius of the University were surveyed. The study involved meeting with an administrative representative from each district to discuss the district's computer curriculum and teacher levels of computer literacy. Visits were subsequently made to the various high schools to view the computer laboratories in operation and interview the teaching staff. The data collected during this survey indicated that: (a) 100% of the schools surveyed used the Apple IIe system, (b) 33% of the schools have purchased the Macintosh SE, (c) all six schools philosophically supported the integration of computer technology across disciplines, and (d) fourteen of the twenty-one teachers interviewed felt "ill equipped" and "unskilled" in the areas of computer literacy and technological integration across their curriculum.

OPEN Curriculum

The foregoing survey, pre-service teacher course evaluations, and curriculum research contributed to the development and implementation of the OPEN computer curriculum for pre-service teachers at The University of Akron. The four stages of the OPEN model - Overcome anxiety, Practice until mastery, Educate beyond, and Network for survival - have been in effect since Fall of 1988. As depicted below, the instructional model strives to promote the development of computer competencies through a cyclical training process.

Insert Figure 1 about here

In the first stage of the OPEN curriculum, pre-service teachers are encouraged to express their opinions and feelings regarding computer technology. The forum seems to expose those students possessing negative feelings regarding computers to alternative views. Also, students who are anxious about the course and their lack of technical expertise find consolation in knowing that others share their apprehensions.

Through open discussion, the instructor guides the students toward a discovery of the strengthes and weaknesses of computer technology in education. In addition, the class is able to explore the meaning of new terms, such as, technology, computer literacy, central processing unit, software, and hardware. The first stage closes with a viewing of the film "High Schools in 2000" (Apple Computer, Inc., 1983) and the instructor's articulation of the courses OPENness to technology - Overcome anxiety, Practice until mastery, Educate beyond, and Networking for survival.

The class immediately progresses into the second stage of the curriculum - practice until mastery - which includes programming in BASIC, programming in LOGO, and mastery of AppleWorks. The student learns to program by completing the following sequence of activities: (a) reviewing educational software for their grade level written in LOGO and/or BASIC, (b) taking a computerized vocabulary quiz written by another student in BASIC or LOGO, (c) viewing the listing and run of the quiz program, (d) discussing the specific, detailed project requirements, and (e) finally, being exposed to a series of lectures and lab tasks designed to progress the student through various programming topics. This brief exposure to programming is intended to familiarize students with the logic behind application packages.

At the end of the third week of the semester, the students present their programming projects to the entire class and explain the coding used to create their quiz. An objective test is administered and the students are introduced to one of the most popular packages in secondary education - AppleWorks.

Because of the pervasive use and availability of the AppleWorks "package," nine weeks of the semester are devoted to mastery of word processing, data base management, and spreadsheet. The curriculum during this implementation stage is designed to emphasize the personal and practical applications of this integrated package to the educator and in education through projects, lectures, and lab activities. In addition, this stage provides the instructor with an opportunity to introduce ideas and concepts regarding teacher education that are not formally taught in any one pre-service course.

During the word processing lectures and project, the instructor relates a complex technology to the students' concept of a professional resume and their experience of drafting a cover letter. The instructor capitalizes on the moment to share information regarding different resume formats, employment trends in teaching, and the importance of the National Teacher's Exam. The data base portion of the curriculum serves to introduce the student to the Ohio Educational Directory (1989-1990), and actively involves individuals in a search for the sixteen school districts where they would be interested in teaching. While constructing their data base of potential employers, students are acquainted with the differences between city, exempted village, local, joint vocational, and non-public schools. Procedures for applying to different

school districts are discussed. Finally, the spreadsheet segment of the AppleWorks package is used to create a subject-specific grade book for future use by the student. Calculating techniques are discussed, various grading scales are examined and weighted grading is critiqued during lecture and lab sessions.

The practice until mastery stage of the OPEN curriculum for pre-service teachers culminates with objective testing and project presentations. Thereafter, the students are prepared to progress into the third stage of the course - educate beyond.

In the third stage of the OPEN curriculum, pre-service teachers are challenged to develop their computer skills beyond the Apple IIe system. Specifically, students are expected to develop a unique instructional item, such as, an in-class handout, tutorial worksheets, a parent/student address data base, or a spreadsheet accounting lesson, using the Macintosh SE system. The design and development of this project using Microsoft Word, Excel, FileMaker, Wingz, and MacDraw affords the students with the opportunity to practice their word processing, data base, and spreadsheet skills while transferring their knowledge to another educational computer system.

By the fourteenth week of the semester, students are prepared to enter into the final stage of the curriculum - networking for survival. In this stage, pre-service teachers are guided toward the realization that they nust seek peer support and continued education in the area of computer technology. The instructor shares information about local computer workshops, professional computer publications, membership in computer consortiums, and usage of ED-ROM (educational read only memory computers) in an effort to support and encourage the life-long growth of computer skills. The course concludes with a lecture on the applicability of the copyright laws to educators and an examination of case studies relating to copyright violations.

Curriculum Results

The success of the OPEN computer literacy curriculum for pre-service teachers at The University of Akron is reflected in student test scores, project grades, and student evaluations of the course. During the 1988-89 academic year, the following results were observed and documented:

(a) 73.68% of the students earned a final grade of an "A" (using a 90 to 100 scale) in the course based on four tests, five projects, and a comprehensive final examination.

(b) 21.05% of the students earned a "B" in the course and 5.26% received a "C" score.

(c) Students stated on the course evaluations that the "course was very informative," "computers will now have a definite place in my teaching," "the computer skills I learned in class will really come in handy during student teaching," and "the course helped me overcome my computer phobia!".

(d) Seven out of ten students who went directly into student teaching after completing the class in Fall 1989 subsequently contacted the instructor to share lesson plans that sought to incorporate computers into their curriculum.

Future Research

Although the OPEN model has only been in effect for one year, student feedback and academic performances seem to support the cyclical progression of pre-service teachers through the curriculum stages of overcoming anxiety, practicing until mastery, educating beyond, and networking for survival. Nevertheless, a concern regarding the OPEN curriculum did manifest itself and must be addressed.

Specifically, the department's practice of grouping all students seeking a secondary education into one computer course ignores the different ability levels of individual students. Since the present course is intended to function as an introduction to computer technology and its applications in education, provisions must be made for pre-service students with advanced computer skills in order to maximize their capabilities. Two viable alternatives exist: (a) challenge the computer skills of the advanced students within the context of the OPEN curriculum, or (b) design and implement an accelerated course geared toward the advanced computer skills of students seeking their secondary certification.

In conclusion, further research is needed in order to determine whether or not different ability levels should be separated in an introductory computer course. If it is determined that pre-service teachers should be divided on the basis of computer ability then a placement test should be designed, pilotted, and administered (prior to course registration) in order to objectively evaluate student ability levels in computer literacy.

The Department of Secondary Education at The University of Akron will continue to monitor the OPEN curriculum and evaluate its effectiveness. But the results after one year of implementation - positive student feedback and high academic performances - seem to indicate that pre-service teachers can master an OPEN computer curriculum and feel technologically equipped to function as catalysts of change in education.

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Figure 1

OPEN Curriculum Model
for
Pre-Service Teachers